US009679716B2

(12) **United States Patent**
Faurie et al.

(10) **Patent No.: US 9,679,716 B2**
(45) **Date of Patent: Jun. 13, 2017**

(54) **MODULAR ELECTROMECHANICAL SWITCHING ELEMENT**

(71) Applicant: **Siemens Aktiengesellschaft**, Munich (DE)

(72) Inventors: **Jean Jacques Faurie**, Nuremberg (DE); **Khalil Hadir**, Ebermannsdorf (DE)

(73) Assignee: **Siemens Aktiengesellschaft**, Munich (DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/966,753**

(22) Filed: **Dec. 11, 2015**

(65) **Prior Publication Data**

US 2016/0181030 A1 Jun. 23, 2016

(30) **Foreign Application Priority Data**

Dec. 19, 2014 (EP) 14199290

(51) **Int. Cl.**

H01H 19/14	(2006.01)
H01H 19/03	(2006.01)
H01H 19/635	(2006.01)
H01H 19/54	(2006.01)

(52) **U.S. Cl.**

CPC ***H01H 19/14*** (2013.01); ***H01H 19/03*** (2013.01); ***H01H 19/54*** (2013.01); ***H01H 19/6355*** (2013.01)

(58) **Field of Classification Search**

CPC H01H 19/03; H01H 19/54; H01H 19/14; H01H 19/6355

USPC ... 200/336, 6 A, 16 A, 43.08, 564, 566, 568

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,282,414	A *	8/1981	Johnston	H01H 11/0006 200/16 A
6,025,564	A *	2/2000	Verduci	B60Q 1/1476 200/61.27
6,274,835	B1	8/2001	Mo	
7,870,810	B2	1/2011	Da Dalt et al.	
2008/0141744	A1	6/2008	Desaphie et al.	

FOREIGN PATENT DOCUMENTS

DE	3541390	A1	8/1986
DE	602005003022	T2	8/2008

* cited by examiner

Primary Examiner — Edwin A. Leon

(74) *Attorney, Agent, or Firm* — Cozen O'Connor

(57) **ABSTRACT**

An electromechanical switching device for providing an electrical connection between terminals as a function of a switched state based on a manual activation, where the switching device has a rotatably mounted activation unit that can be activated manually and a switching unit which is connectable to the activation unit, the switching unit provides pat least two electrical terminals and electrically interconnects them as a function of the electrical switched state, for which purpose the switching unit has at least one switching element slideably mounted in a longitudinal direction of the switching device, the switching device has a coupling unit that mechanically interconnects the activation and switching units and that is configured to transmit the manual activation of the activation unit to the switching element of the switching unit, and where the electromechanical switching device is formed in a modular manner via at least the activation, coupling unit and switching units.

14 Claims, 11 Drawing Sheets

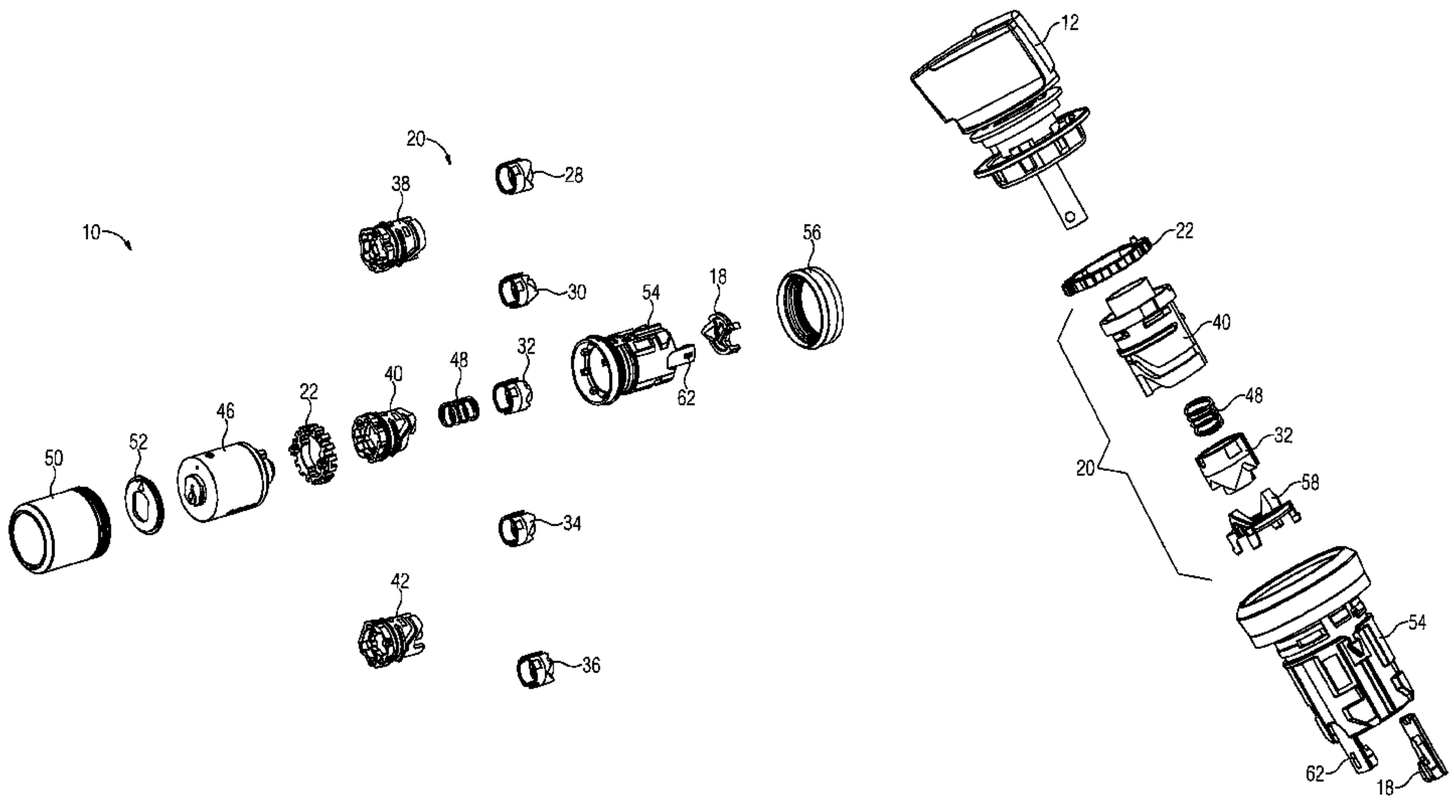


FIG 1

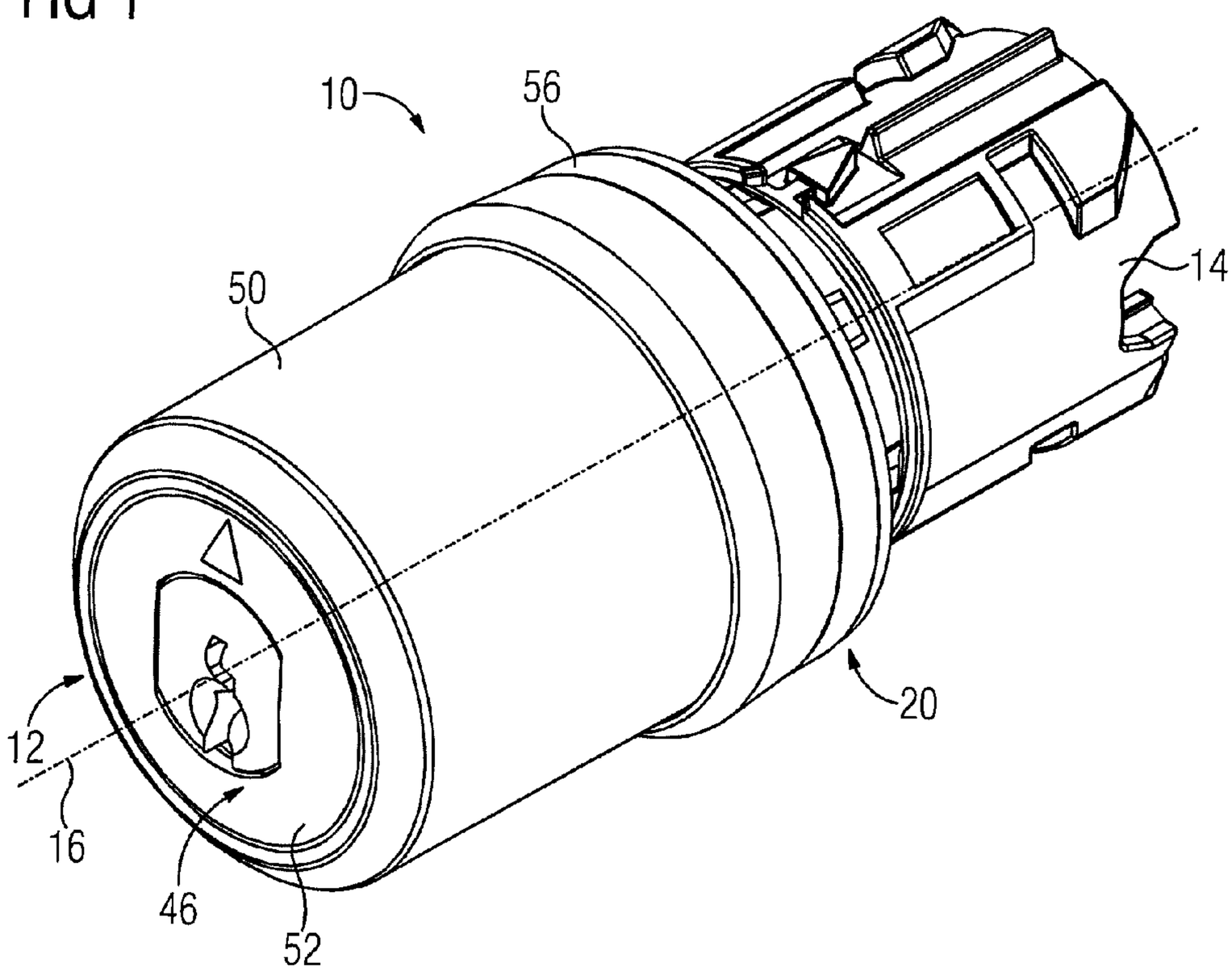
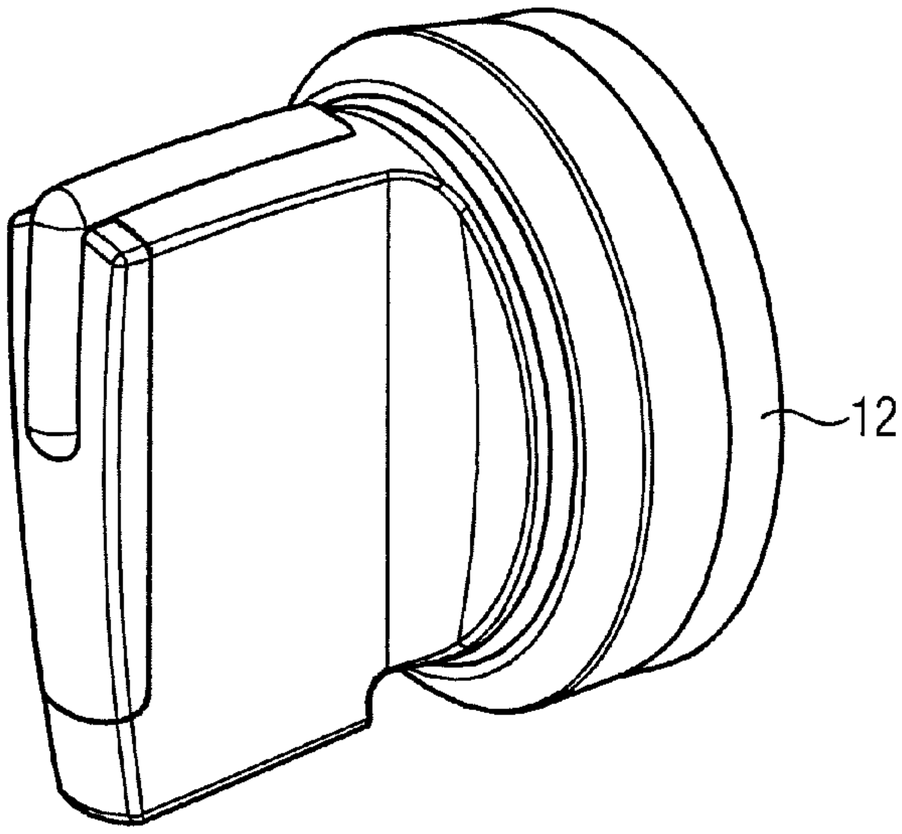


FIG 2



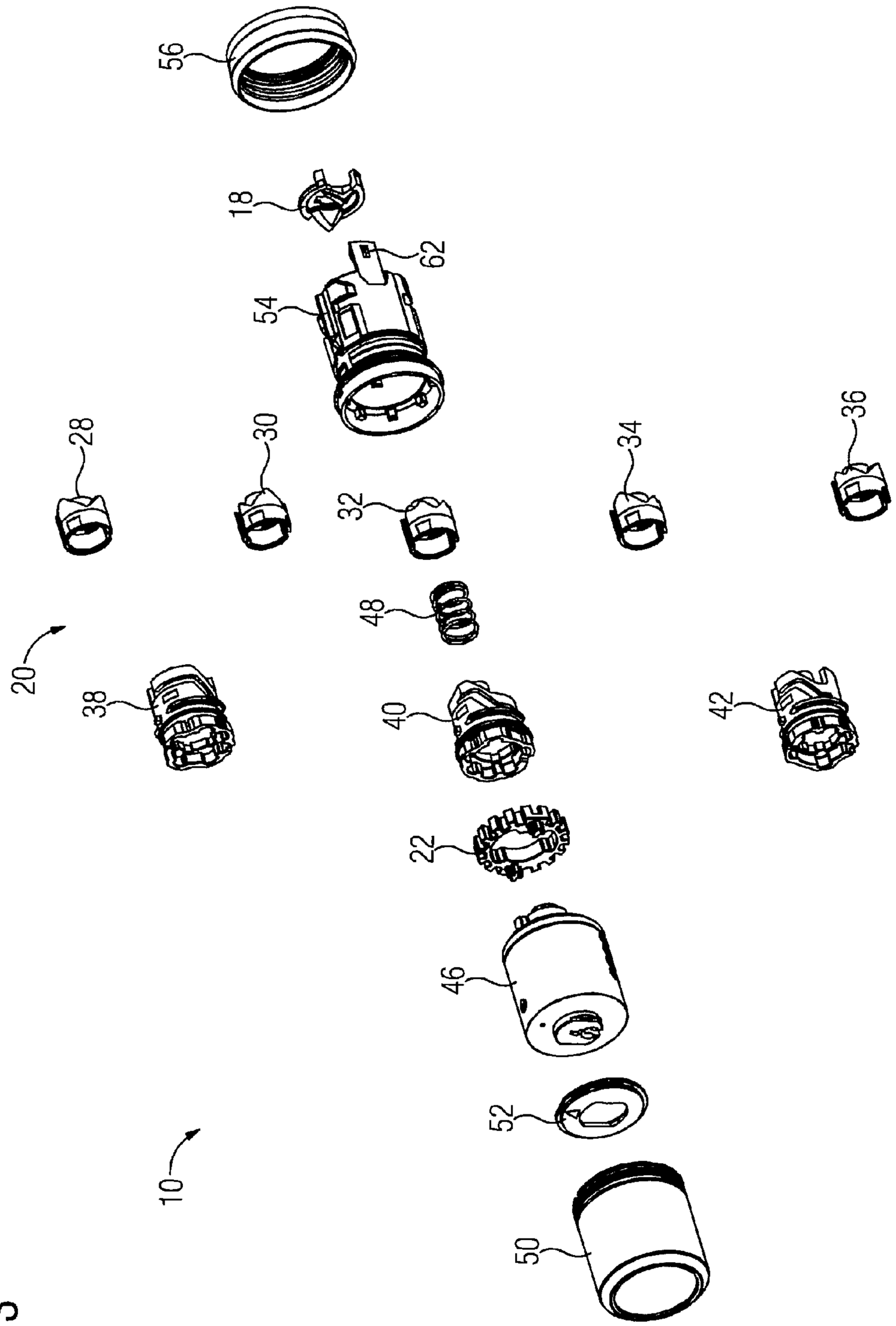


FIG 3

FIG 4

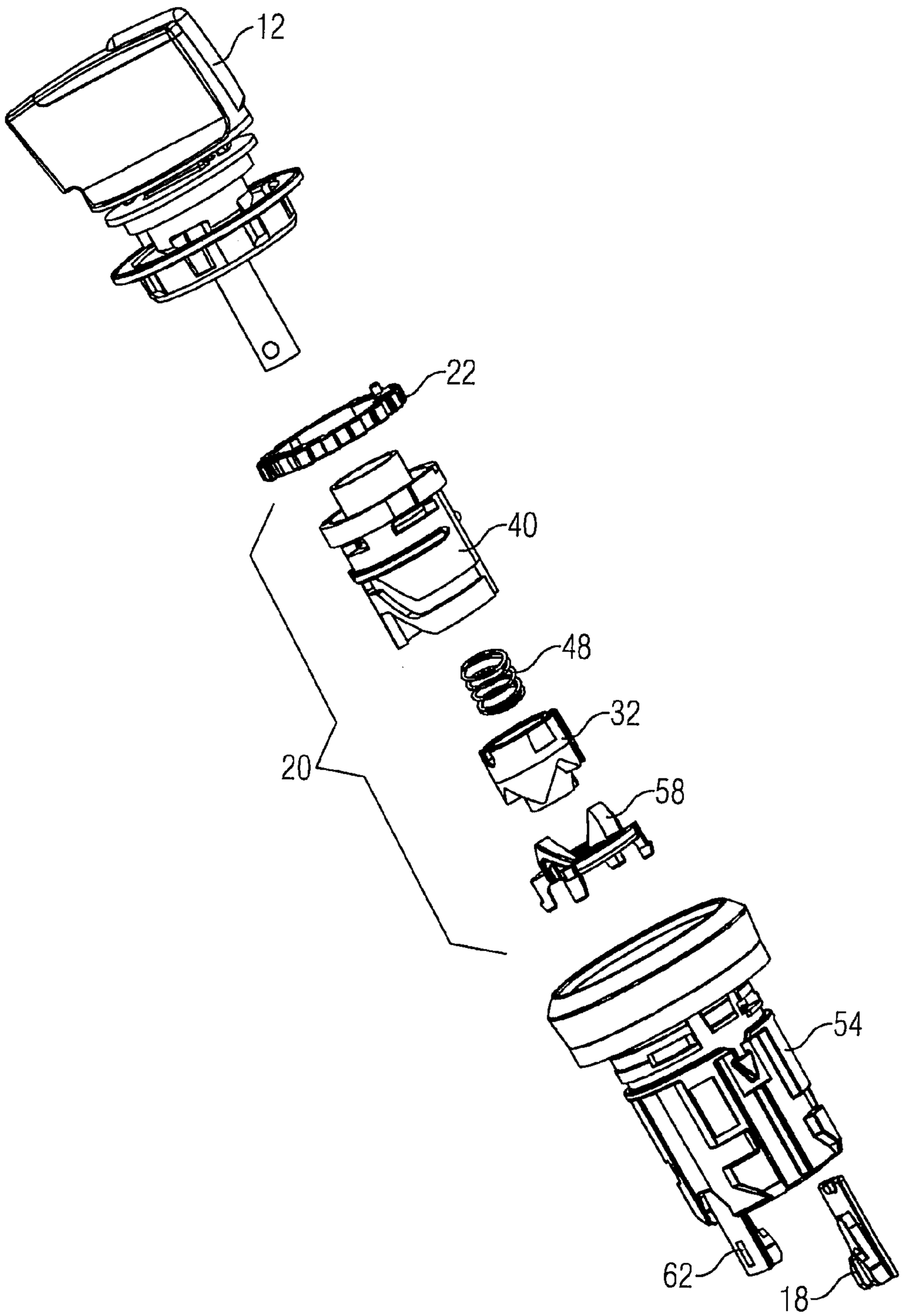


FIG 5

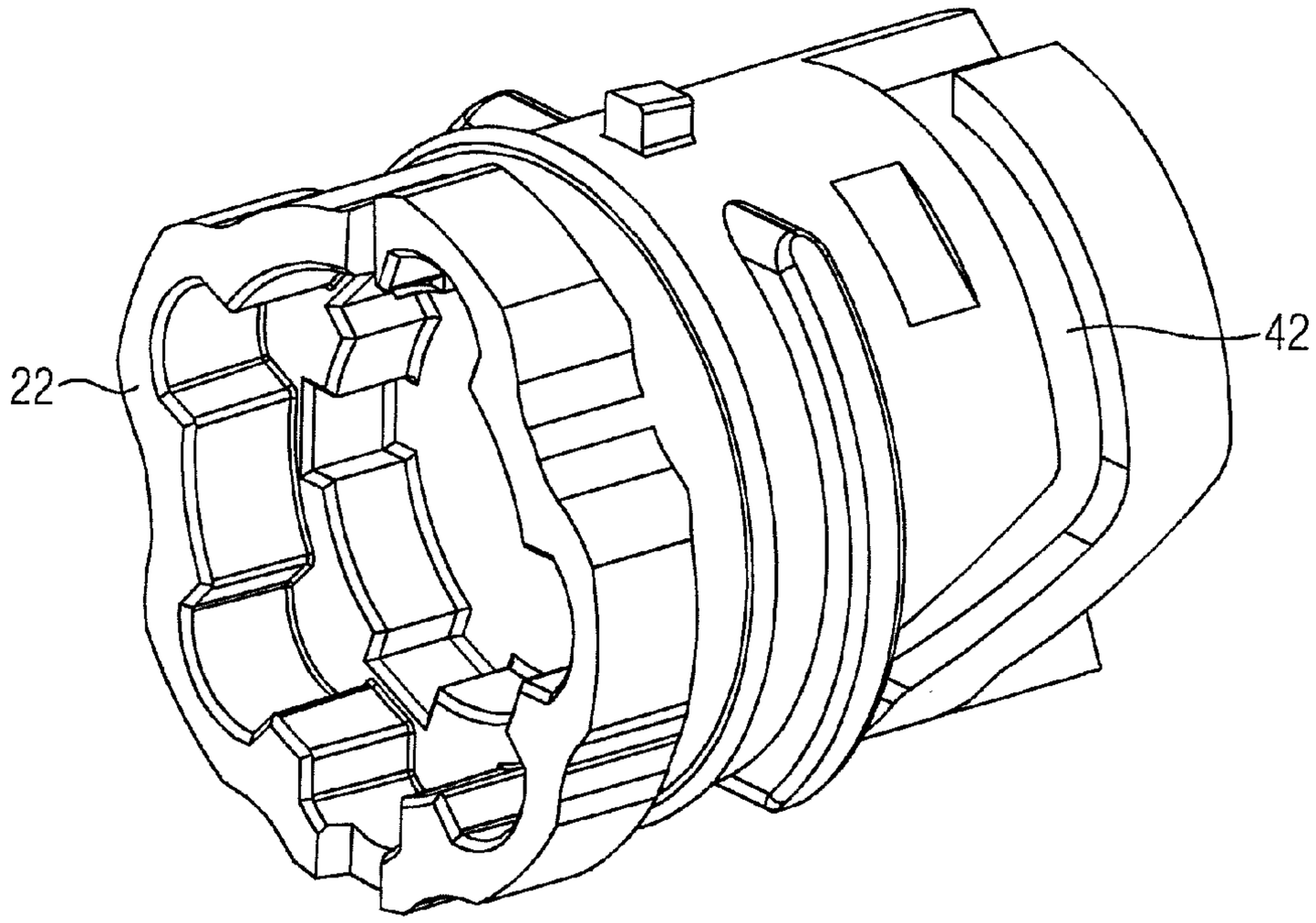


FIG 6

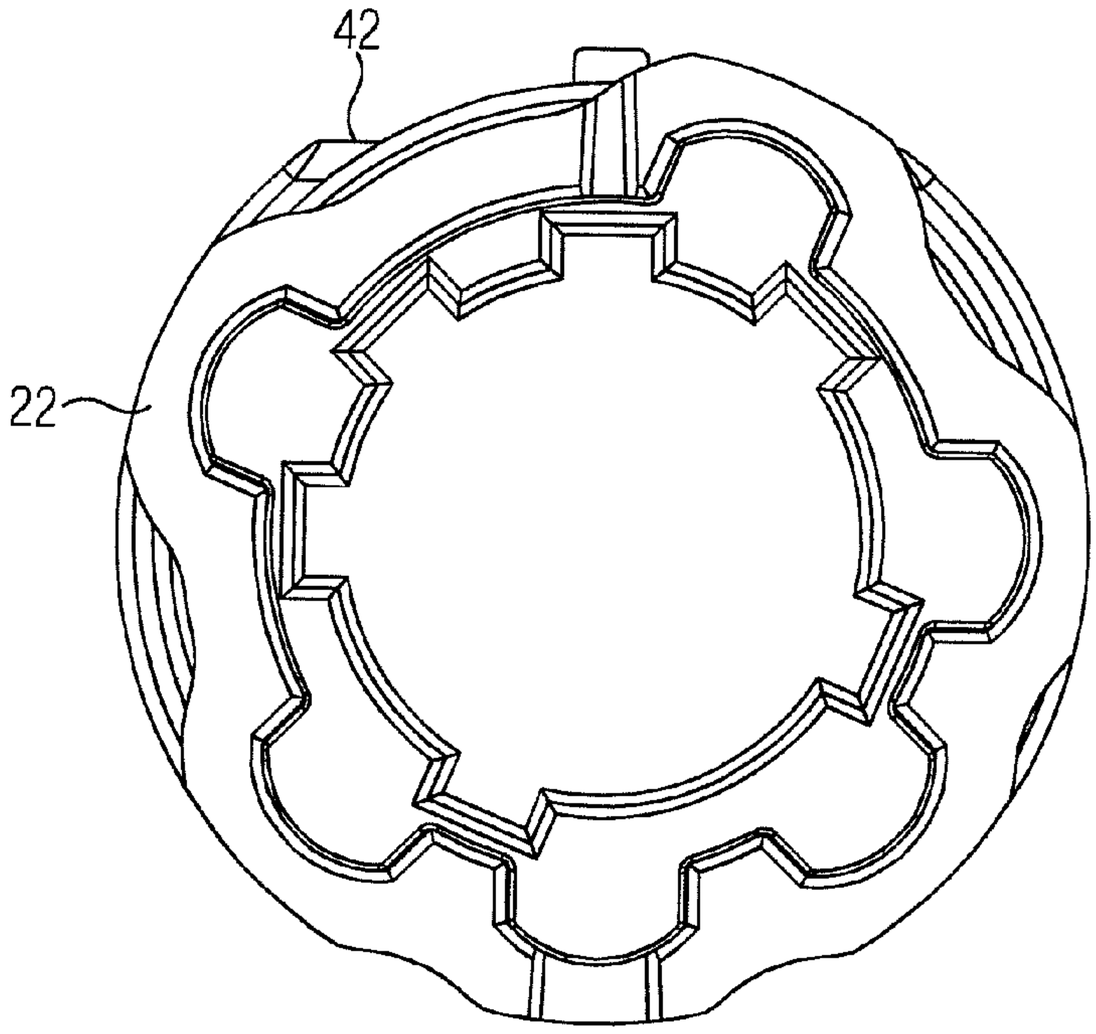


FIG 7

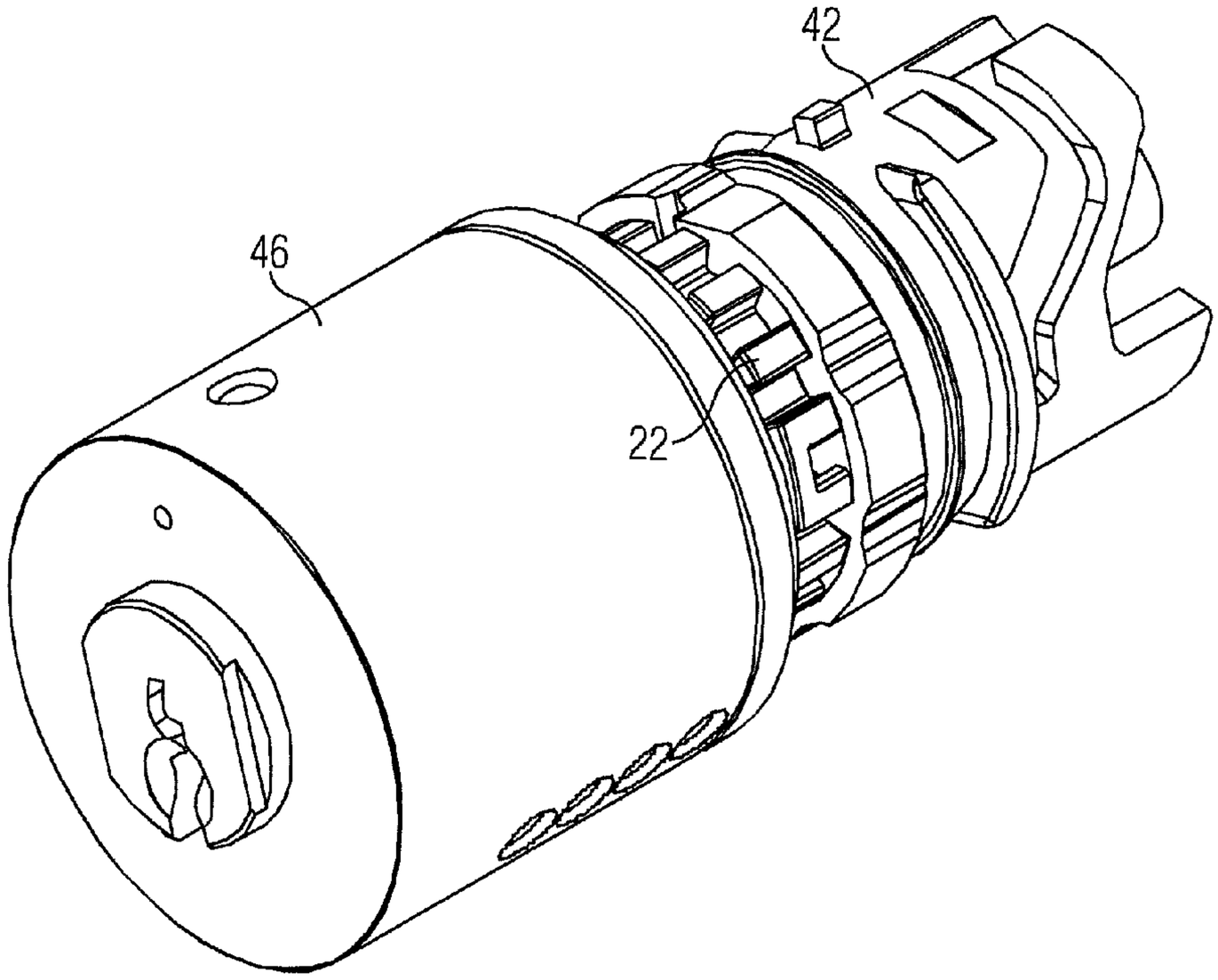


FIG 8

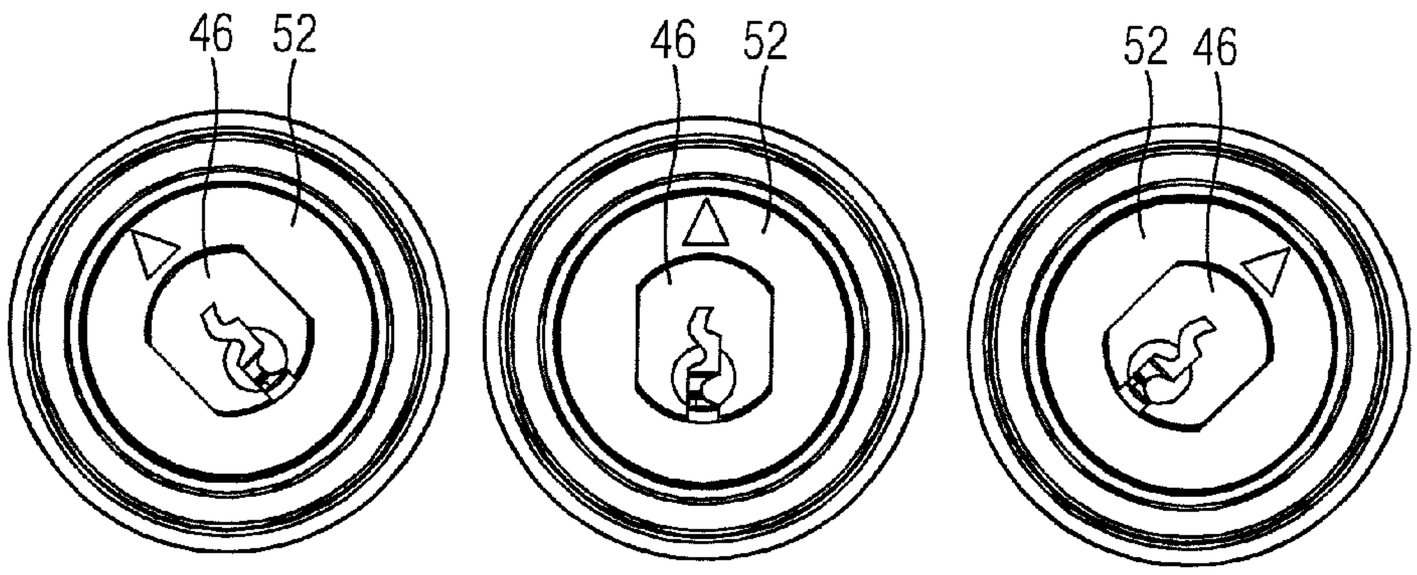


FIG 9

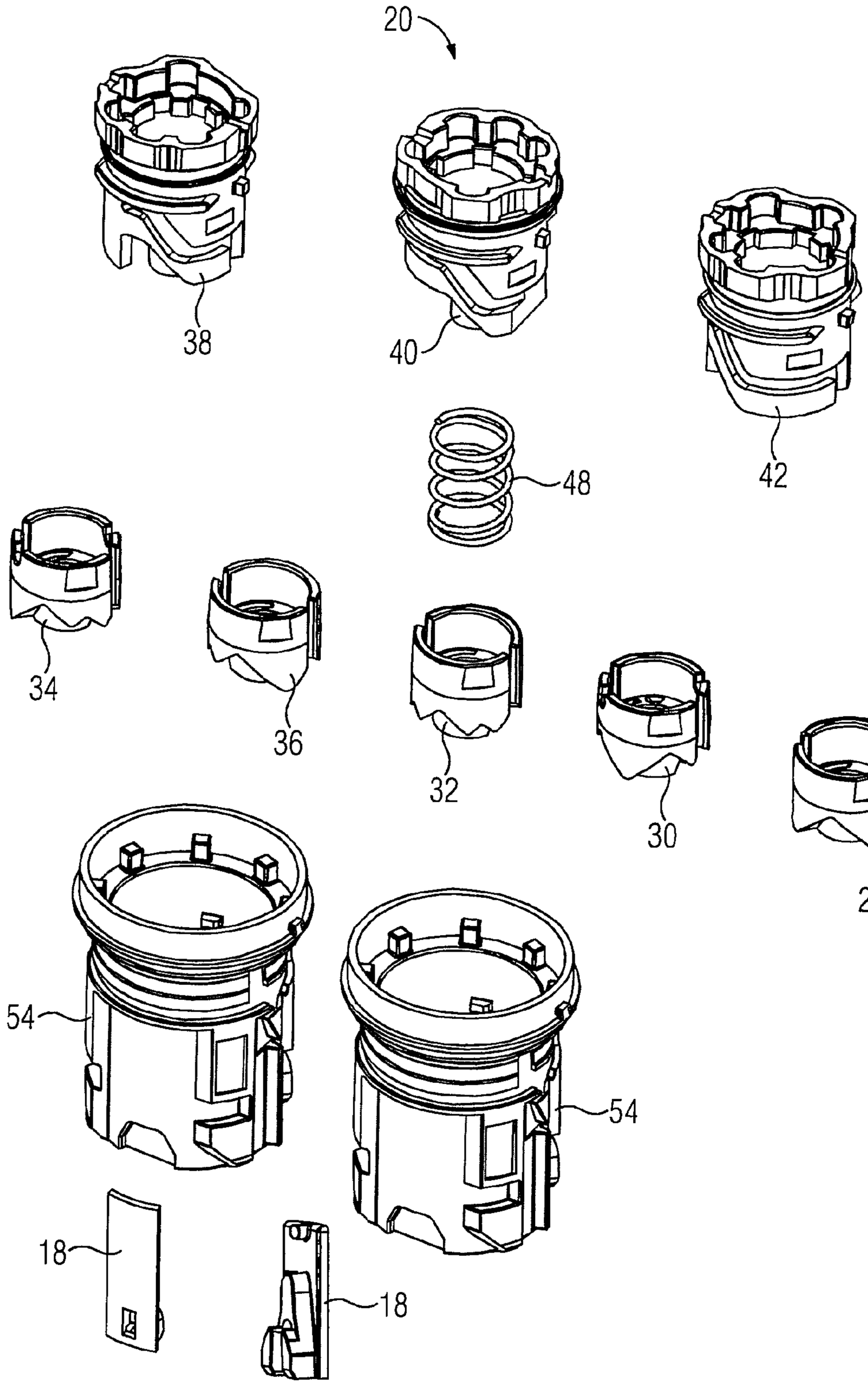


FIG 10

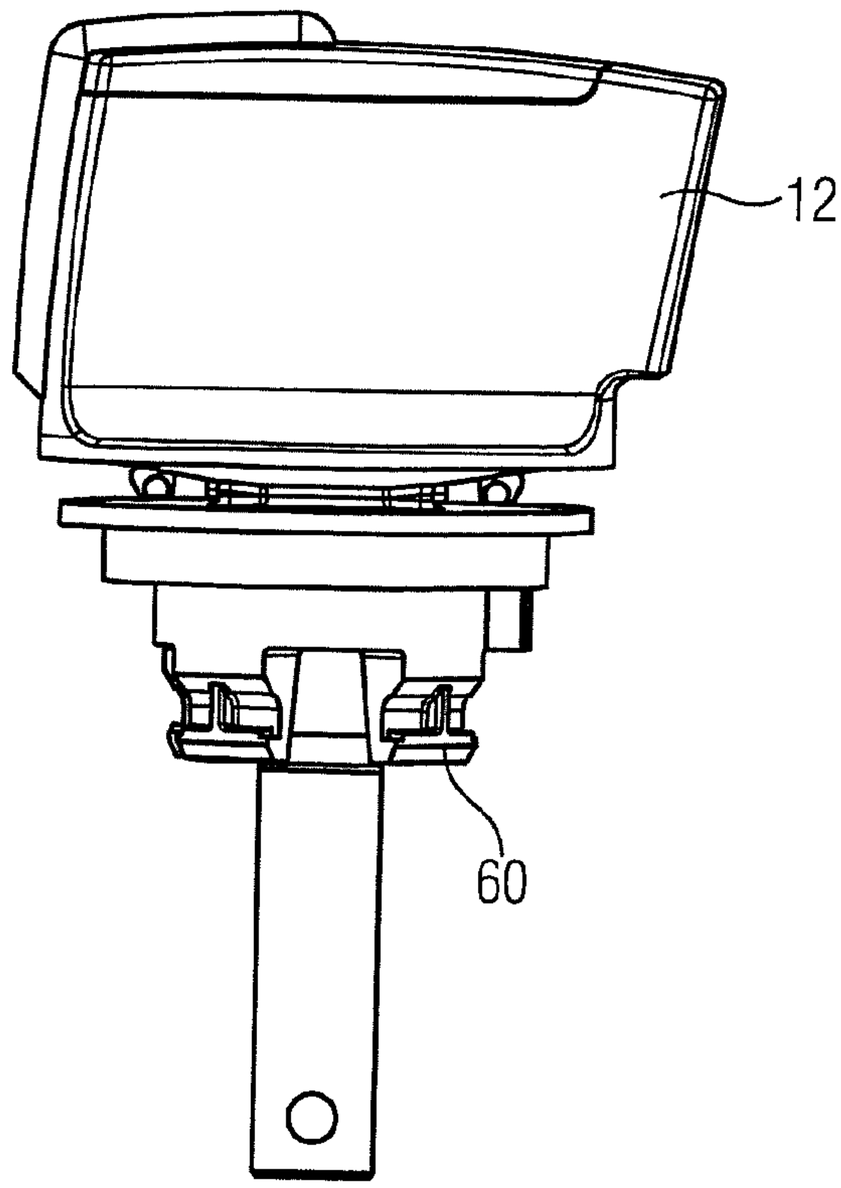


FIG 11

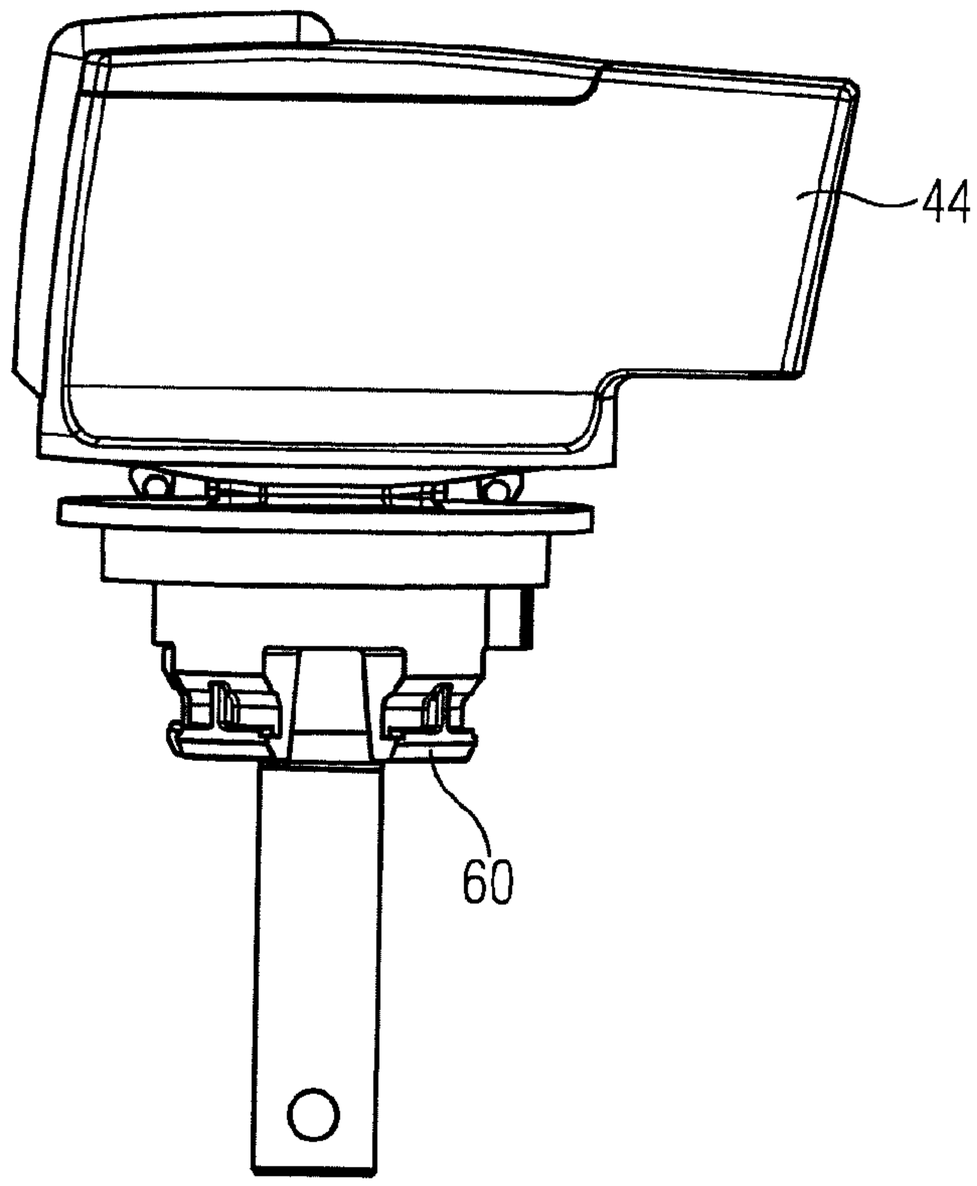


FIG 12

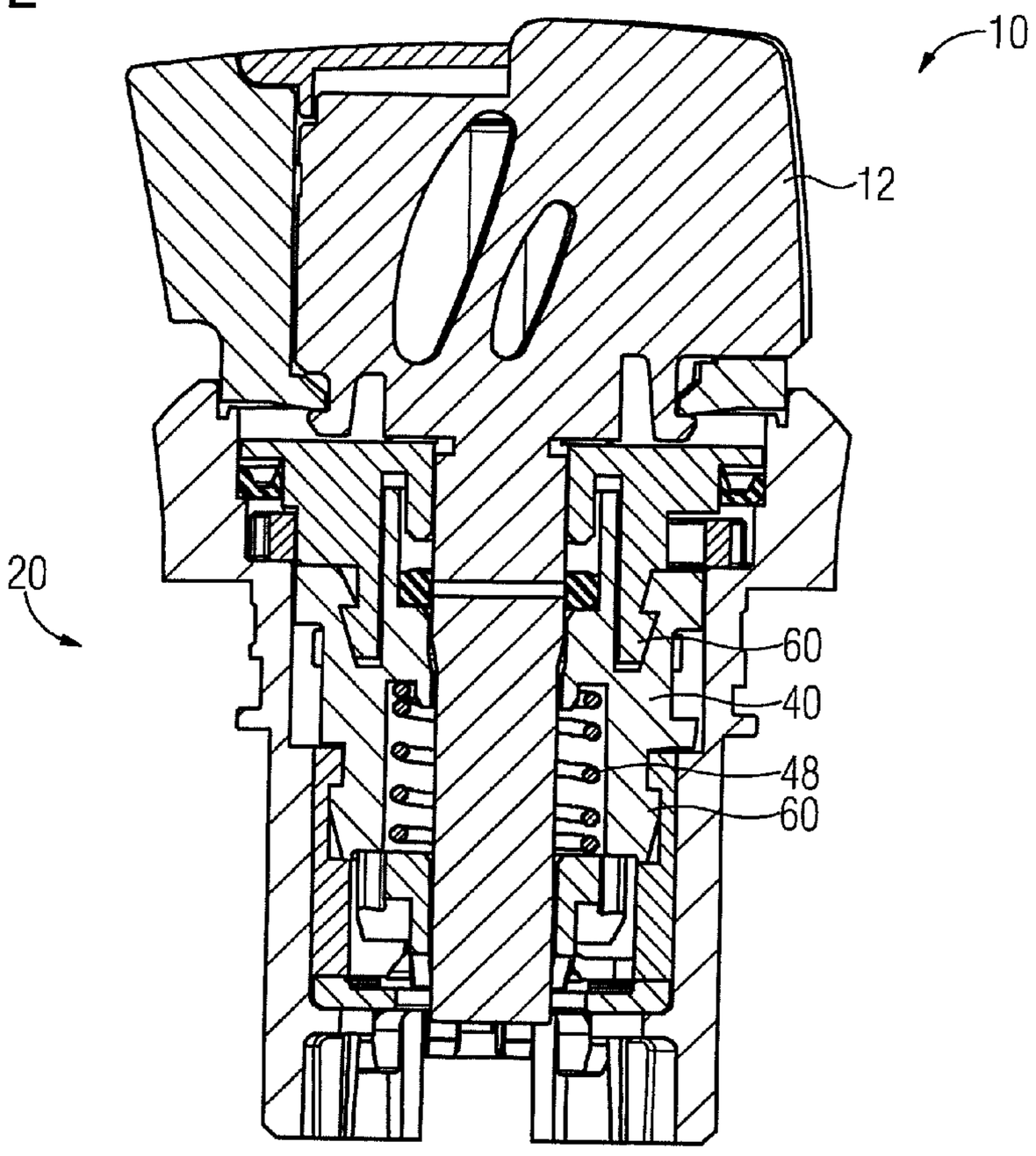


FIG 13

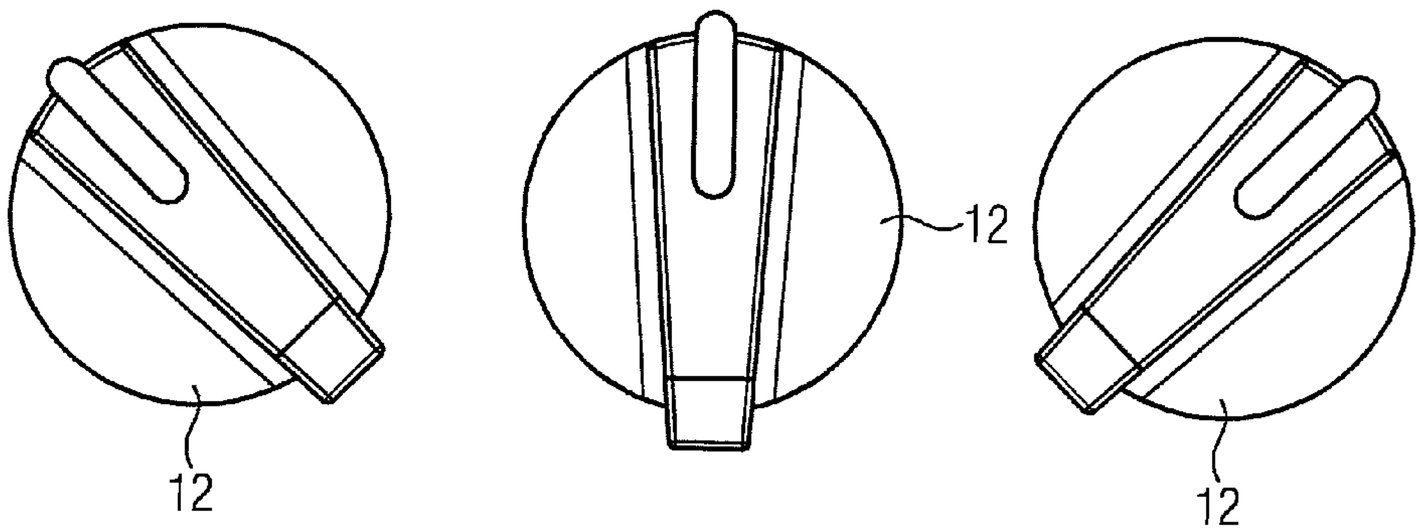


FIG 14

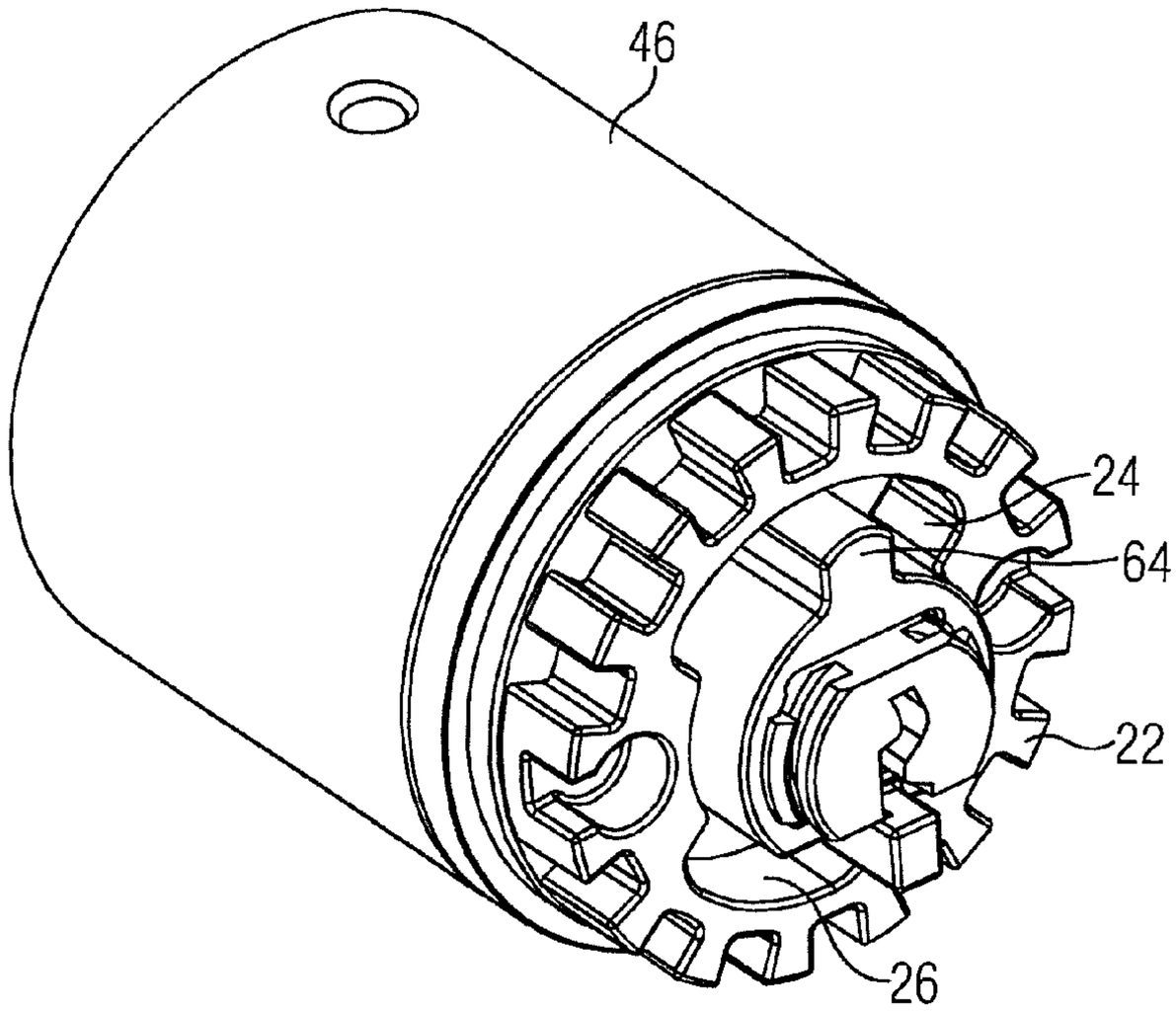


FIG 15

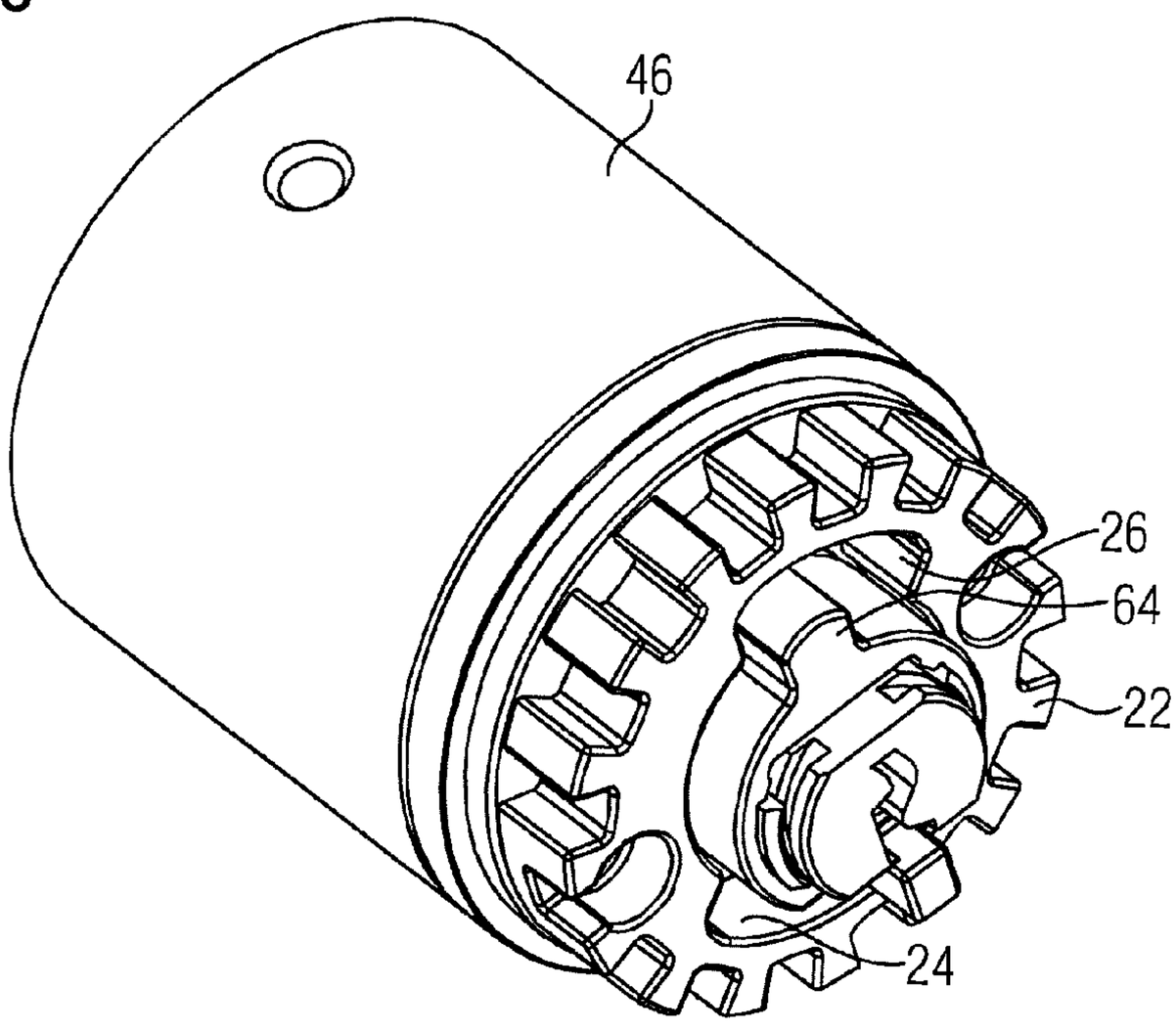


FIG 16

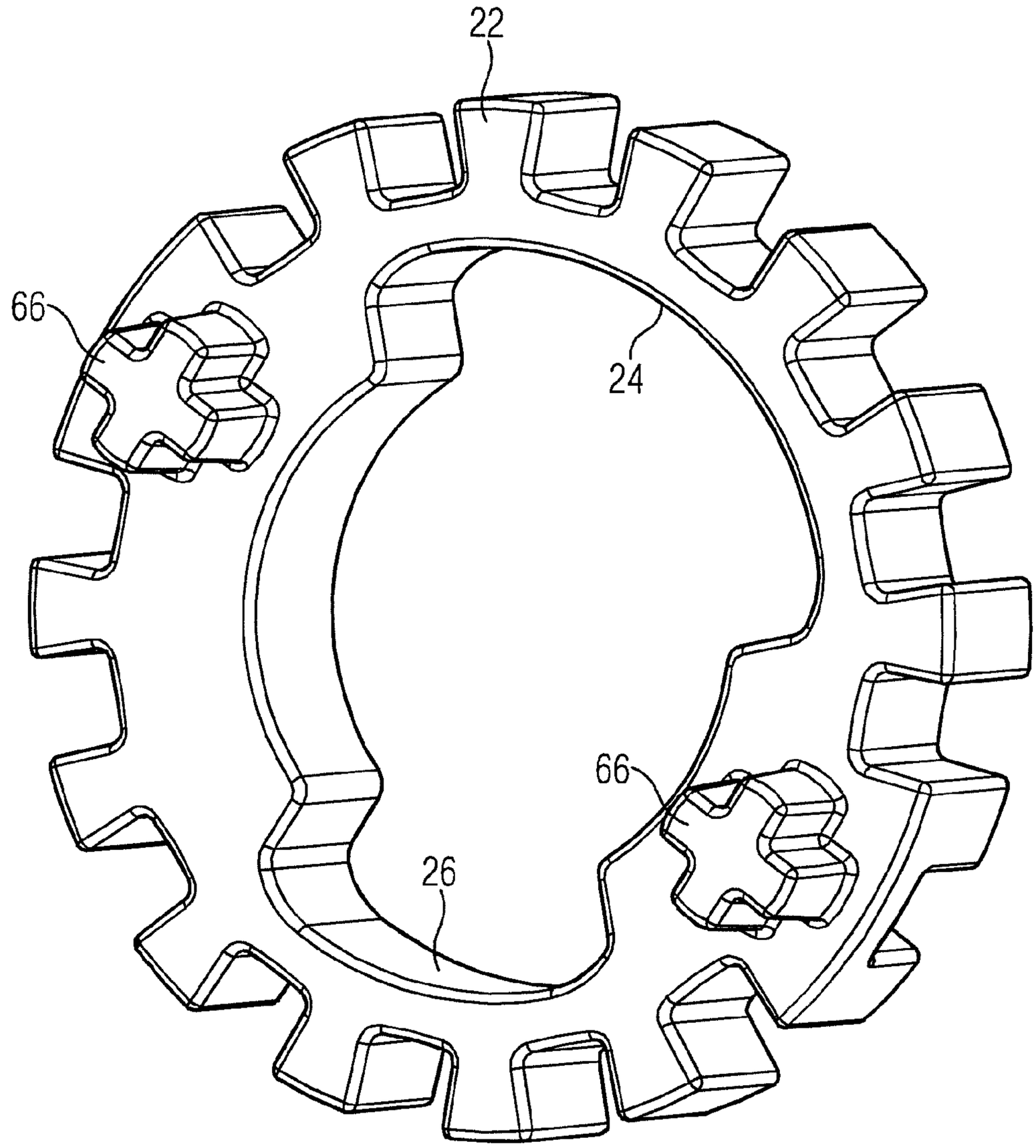
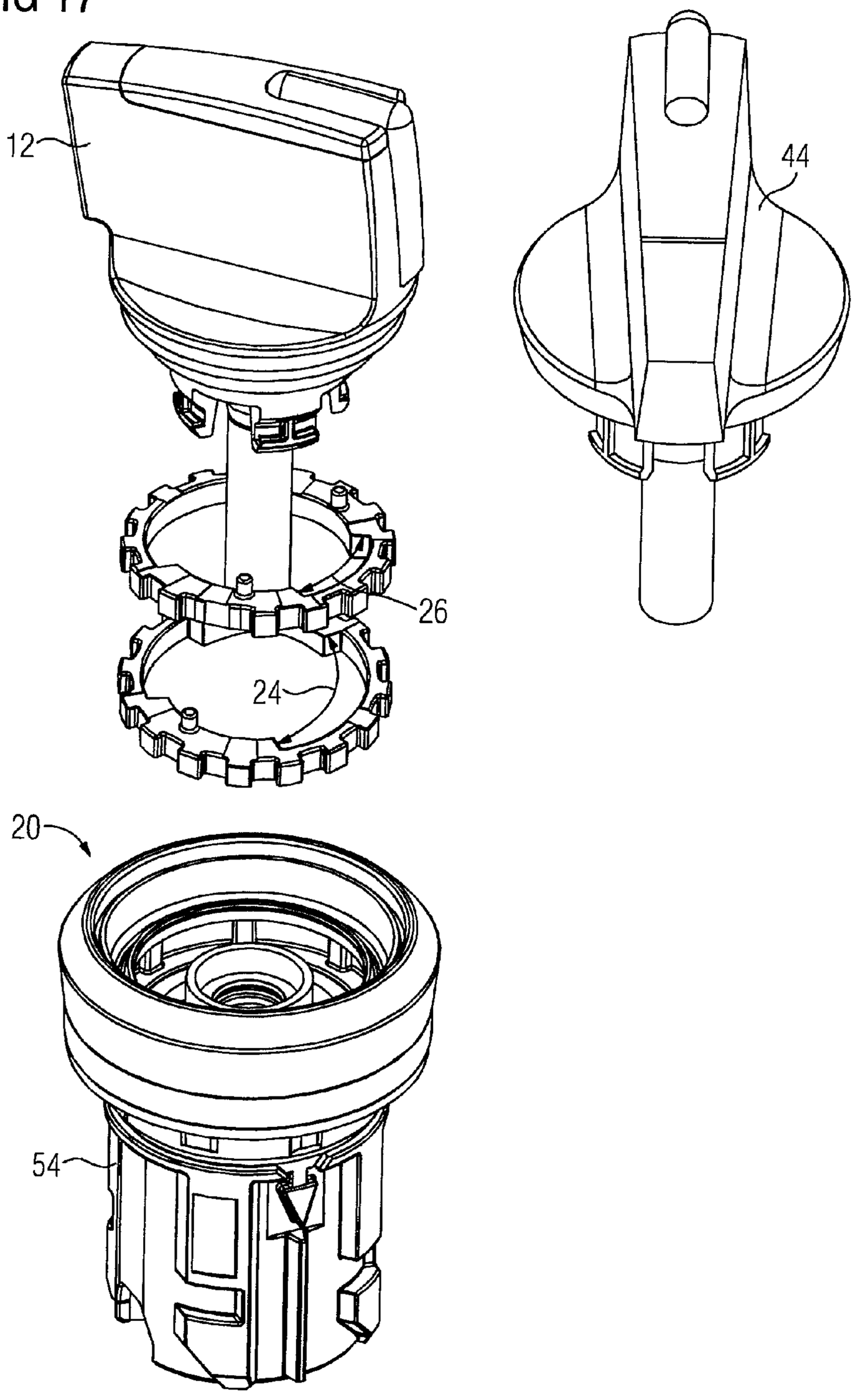


FIG 17



MODULAR ELECTROMECHANICAL SWITCHING ELEMENT

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an electromechanical switching device for making available an electrical connection between at least two terminals as a function of a switched state on the basis of a manual activation, where the electromechanical switching device is configured to be arranged in a switchboard of an electrical control device and has an activation unit that is rotatably mounted and can be activated manually and a switching unit which is connectable to the activation unit, where the switching unit makes available the at least two electrical terminals of the electromechanical switching device and electrically connects them to one another as a function of the electrical switched state, for which purpose the switching unit has at least one switching element that is mounted so as to be slideable in a longitudinal direction of the electromechanical switching device.

2. Description of the Related Art

Electromechanical switching devices of the generic type are basically known with the result that no separate documented evidence for them is necessary. They are usually used in switchboards that serve to control electrical systems, at least partially electrically operated machines, combinations thereof or the like. Here, the electromechanical switching devices serve, in particular, to activate or deactivate electrically controllable functions that are usually activated or deactivated by a control voltage in the form of a low voltage. In this context, it has become accepted practice mainly to use rotationally activated electromechanical switching devices for the electromechanical switching elements. As a result, on the one hand, simple handling can be achieved and, on the other hand, simple mounting and arrangement in the switchboard can be implemented. The switchboard can be formed by a wall that can be formed from a metallic material, such as sheet steel. However, it can also be formed from a plastic or a composite material. In addition, the switchboard can, however, also be formed as a switch box or as a switch cabinet and can make available a closed-off cavity in which electrical lines are preferably connected.

The switchboard usually has an opening that is adapted to external dimensions of the electromechanical switching device and into which the electromechanical switching device is inserted and attached.

On the operator control side, the rotatably mounted activation unit, which can be activated manually, protrudes beyond a surface of the switchboard, with the result that it can be activated manually by an operator. In contrast, the switching unit that is connected to electrical lines via terminals of the switching unit to form or interrupt an electrical connection between two or more of the electrical lines in accordance with the respective current switched state of the electromechanical switching unit protrudes at the back.

On the activation side, essentially two different embodiments can be differentiated, specifically a key-activated activation unit and secondly a rotary toggle lever activation unit. Furthermore, there are a multiplicity of different refinements with respect to the switching unit and the switched states which can be assumed.

For these different electromechanical switching elements, there are respective separate designs that give rise to a multiplicity of different electromechanical switching devices and which require corresponding expenditure for manufacture.

SUMMARY OF THE INVENTION

The object of the invention is to reduce the expenditure on an electromechanical switching unit.

This and other objects and advantages are achieved in accordance with the invention by providing an electromechanical switching device that has a coupling unit that mechanically interconnects the activation unit and a switching unit to one another and which is configured to transmit the manual activation of the activation unit to a switching element of the switching unit, where the electromechanical switching device is formed in a modular manner by at least the activation unit, the coupling unit and the switching unit.

The coupling unit ensures that the electromechanical switching device can be manufactured in a modular manner from the activation unit, coupling unit and switching unit components, combined in virtually any desired manner. Specific, preferably standardized, connections can be provided between the coupling unit and the activation unit as well as the coupling unit and the switching unit via the coupling unit. As a result, an electromechanical switching device of any desired type can be assembled easily from a kit composed of few components. In this context, it proves particularly advantageous that even the individual components, specifically the coupling unit, the activation unit and the switching unit as well as the elements assigned thereto can be used as pre-tested assemblies. As a result, the manufacture of electromechanical switching devices can be considerably simplified, with the result that very different electromechanical switching devices can be manufactured according to needs, even within a short period. With the invention it is therefore possible to make the fabrication of electromechanical switching devices considerably more flexible. Furthermore, the invention permits the individual components of the electromechanical switching device, specifically the coupling unit, the activation unit and the switching unit, to be manufactured separately at different times and at different locations, and only then to be combined to form the electromechanical switching device if corresponding orders have been received. The modules can be formed by the activation unit, the coupling unit and the switching unit.

The invention proves particularly advantageous especially for the application that is generally provided in the low-voltage range according to the standard, in particular the guideline 2006/95/EC of the European Parliament and of the European Council of 12 Dec. 2006 for harmonizing the legal requirements of the Member States regarding electrical equipment for use within certain voltage limits. As is known, particular technical requirements, which also have to satisfy particular tests, are made of such electromechanical switching devices. Despite this particular expenditure in terms of electrical safety, with the invention it is possible to implement the modular design which permits favorable fabrication of the electromechanical switching devices.

The electromechanical switching device is, as a rotationally activated electromechanical switching device, typically provided with a longitudinal axis that generally, at the same time, also constitutes a rotational axis with respect to the rotatable bearing of an activation element of the activation unit. In specific embodiments, the axes may also deviate from one another. For the sake of electrical safety, the electromechanical switching device is usually divided into two regions, specifically a region for manual activation,

which is sufficiently electrically insulated with respect to an electrically active region that makes available the actual switching function in accordance with the switched state of the electromechanical switching device. Furthermore, the switching unit generally also makes available the terminals between which the electrical connection is formed or disconnected in accordance with the respective switched state. On the basis of this configuration, the activation region usually protrudes out of the switchboard, whereas the active region is disconnected (i.e., in particular shielded) from the activation region by the switchboard, i.e., with respect to the electrical safety and the electrical insulation.

The coupling unit preferably constitutes a connecting region that is correspondingly coupled in a rotatable manner to the activation unit for transmitting a rotational movement of the activation unit. For example, the connection can be formed by virtue of the fact that the coupling unit has an encoded receptacle for a correspondingly oppositely encoded projection of the activation element, with the result that a rotationally fixed connection can be brought about between the two. However, it can also be provided that a latching element of the activation unit engages in a latching receptacle of the coupling unit to form the rotational connection.

The coupling unit is also provided for converting the rotational movement, which is applied to the coupling unit by means of the activation element, into a translatory movement, and for correspondingly sliding the switching element of the switching unit in a translatory fashion. As a result, the switching element can implement the desired switched state. Corresponding axial positions of the switching element are therefore brought about in accordance with the respective rotational positions of the activation element. Corresponding contacts that are connected to the terminals of the switching unit are switched in accordance with the respective positions of the switching element in relation to the respective switched states. As a result, a multiplicity of switching functions can be implemented in a desired manner with only a few components by the electromechanical switching device in accordance with the invention.

The switching element itself can be formed, for example, in an axially sliding manner and can have one or more electrically conductive regions by which electrical connections can be formed between contacts of the switching unit or interrupted.

In accordance with one advantageous embodiment, the coupling unit has a rotational-angle-limiting disk that has at least one rotational-angle-limiting element. The rotational-angle-limiting disk is preferably arranged in the connecting region between the coupling unit and the activation unit. A rotational angle of the activation element can be set in a predefinable manner with the rotational-angle-limiting disk. For example, the rotational angle can be limited to 90 degrees. Furthermore, the rotational angle can also be limited to 45 degrees. The rotational-angle-limiting disk is advantageously configured to be able to limit a plurality of rotational angles. Through corresponding setting or assembly of the rotational-angle-limiting disk, it is possible to ensure that a respective limiting angle can be set in relation to manual activation of the activation unit. The rotational-angle-limiting elements can be formed, for example, by cutouts (i.e., openings) in the rotational-angle-limiting disk. The cutout preferably extends over a rotational angle region that permits an actuating range over the desired rotational angle.

In accordance with another embodiment, the rotational-angle-limiting disk is arranged in a rotationally fixed manner with respect to the switching unit. The rotational-angle-limiting disk is particularly advantageously connected to the switching unit via the coupling unit. As a result, it is possible to define the permissible rotational angle with respect to the switching unit as a reference point.

Another embodiment in accordance with the invention proposes that the coupling unit has a link element that interacts with a crown element. In accordance with the contemplated embodiment, it is easily possible to convert the rotational activation of the activation unit into an axial movement that acts on the switching element. At the same time, it is possible for the crown element to connect in a rotationally fixed manner to the link element, where the crown element is arranged in an axially movable manner and interacts with an insertion base that is arranged secured in a rotationally fixed manner in a rosette and in the longitudinal direction of the electromechanical switching device, in order to make available the desired latching and/or instantaneous-contact functions. The link element preferably makes available a link that acts on the switching element and converts a rotational movement into an axial movement of the switching element. Therefore, the link element is preferably rotatably mounted and connected in a rotationally fixed manner to a rotational axis of the activation unit. As a result, the rotational movement of the activation unit can act directly on the link element. In this way, a simple and easy-to-control arrangement can be achieved.

Furthermore, the crown element is mounted so as to be rotatable with the link element and so that it is slideable in the link element in the longitudinal direction of the electromechanical switching device. As a result, it is possible, for interaction with the link element, to convert a rotational activation of the activation unit into a longitudinal movement and to cause the activation unit act on the switching device. For this, the switching element preferably has at least one contact region that interacts with the link which is made available by the link element. The slideable bearing of the crown element in the link element permits a crown link that faces the insertion base to interact with the insertion base and as a result make available desired mechanical functions, such as latching and/or instantaneous contact For example, for this purpose one or more bearing points for the crown element can be provided in the link element.

It proves to be particularly advantageous if the crown element is prestressed in the direction of the insertion base. As a result, on the one hand, it is possible to ensure that the crown element is continuously in engagement with the insertion base, specifically independently of a rotational position of the activation element.

Furthermore, the coupling unit has a modular configuration in particular as a separate module, in each case with a crown element, a link element and a spring. With the modular configuration, it is possible to be able to produce the electromechanical switching device easily and flexibly in a way that is compatible with requirements and in a multiplicity of functional configurations. The modules can be formed by elements of the coupling unit. As a result, the basic mechanical design of the electromechanical switching device can be maintained essentially independently of the modules that are used.

In accordance with a further embodiment, the crown element and/or the link element are arranged in an exchangeable manner in the coupling unit. The present embodiment permits an electromechanical switching device to be equipped with another function, even through retrofitting. For this purpose, it is then easily possible for the crown element and/or the link element to be exchanged.

Standardized dimensions for the crown element and/or the link element are preferably provided, with the result that they can easily be exchanged as desired in the coupling unit.

Other objects and features of the present invention will become apparent from the following detailed description considered in conjunction with the accompanying drawings. It is to be understood, however, that the drawings are designed solely for purposes of illustration and not as a definition of the limits of the invention, for which reference should be made to the appended claims. It should be further understood that the drawings are not necessarily drawn to scale and that, unless otherwise indicated, they are merely intended to conceptually illustrate the structures and procedures described herein.

BRIEF DESCRIPTION OF THE DRAWINGS

Further advantages and features can be found in the following description of exemplary embodiments. In the figures, identical components and functions are denoted by identical reference symbols, in which:

FIG. **1** shows a schematic-perspective view of a modular electromechanical switching device in accordance with the invention;

FIG. **2** shows a schematic-perspective illustration of a rotary toggle lever as an activation unit for the electromechanical switching device in accordance with the invention;

FIG. **3** shows a schematic exploded illustration of the electromechanical switching device of FIG. **1**, where optionally usable components are illustrated;

FIG. **4** shows a further electromechanical switching device of the invention in a perspective exploded illustration with an activation unit of FIG. **2**;

FIG. **5** shows a schematic-perspective view of a stop disk in conjunction with a link element;

FIG. **6** shows a schematic plan view of the arrangement of FIG. **5**;

FIG. **7** shows a schematic-perspective view of a lock in conjunction with the assembly illustrated of FIGS. **5** and **6**;

FIG. **8** shows a schematic view of three possible home positions which can be implemented with the assembly of FIG. **7**;

FIG. **9** shows a schematic, cut-out exploded illustration of possibilities for the coupling unit in conjunction with the switching unit;

FIG. **10** shows a schematic side view of a first rotary toggle lever as an activation unit in accordance with the invention;

FIG. **11** shows a schematic side view of a second rotary toggle lever as an activation unit in accordance with the invention;

FIG. **12** shows a schematic side view of a detail of the electromechanical switching device of FIG. **4** in an assembled state;

FIG. **13** shows a schematic illustration of possible home positions for the rotary toggle lever of FIG. **12**;

FIG. **14** shows a schematic illustration of a first embodiment of a stop disk with the activation element;

FIG. **15** shows a schematic illustration of a second refinement of the stop disk in conjunction with the activation element in a schematic-perspective view as in FIG. **14**;

FIG. **16** shows a schematic-perspective illustration of the stop disk of FIGS. **14** and **15**; and

FIG. **17** shows a schematic-perspective view of a further embodiment of an electromechanical switching device in accordance with the invention, where different activation units can optionally be mounted.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

FIG. **1** shows a first embodiment of an electromechanical switching device **10** in accordance with the invention, where the switching device serves to make available an electrical switched state as a function of a manual activation. The electromechanical switching device **10** is also configured to be arranged in a switchboard (not illustrated) of an electrical control device (not illustrated further). The electromechanical switching device **10** has, in this first exemplary embodiment, a rotatably mounted activation unit **46**, which can be activated manually, in the form of a lock **46** which can be activated by key. In addition, the electromechanical switching device **10** has a switching unit **14** which can be connected to the lock **46** and makes available here two electrical terminals **62** of the electromechanical switching device **10** and electrically connects them to one another as a function of the electrical switched state and has a switching element **18** (FIG. **3**) which is mounted so as to be slideable in a longitudinal direction **16** of the electromechanical switching device **10**. The switching unit **14** is configured to assume the switched state as a function of the activation of the lock **46**.

In addition, the electromechanical switching device **10** of FIG. **1** comprises a coupling unit **20** that connects the lock **46** and the switching unit **14** to one another mechanically. The coupling unit **20** is also configured to transmit the manual activation of the lock **46** to the switching element **18** of the switching unit **14**.

FIG. **2** shows, in a perspective schematic view, a second embodiment of an activation unit in accordance with the invention, specifically a rotary toggle lever **12**. The latter can be mounted instead of the lock **46** of FIG. **1**.

An essential aspect of the invention, specifically the kit principle of the electromechanical switching device **10**, is already apparent from FIGS. **1** and **2**. Both embodiments of the electromechanical switching device **10** of FIGS. **1** and **2** are based basically on a comparable design. This is illustrated further by FIG. **3** and FIG. **4**.

FIG. **3** shows a perspective-schematic exploded illustration of the electromechanical switching device **10** of FIG. **1** with optional refinements for the coupling unit **20**. Here, the lock **46** is arranged in a rotationally fixed manner in a sleeve **50**. The lock **46** comprises a rotatably mounted locking cylinder (not denoted) which can be rotatably activated after the insertion of a fitting key, i.e., a key with a corresponding key code. On the front side, the lock cylinder is surrounded by an indicator disk **52** that is secured axially in the longitudinal direction **16** of the electromechanical switching device **10**, between the sleeve **50** and the lock **46**.

On an end side, lying opposite the indicator disk **52** of the lock **46**, a stop disk **22** is arranged by which a rotational angle for the manual activation of the lock **46** can be limited or set. In this regard, the stop disk **22** forms a rotational-angle-limiting unit.

The coupling unit **20**, which comprises here a selection of three possible link elements **38**, **40**, **42**, a spring **48** and a selection of crown elements **28**, **30**, **32**, **34**, **36**, adjoins on the stop-disk side. Depending on the desired switching and/or activation function, link elements and crown elements can be combined with one another. The coupling unit **20** is accommodated on the lock side in a rosette **54** together with the stop disk **22**, which rosette **54** also at the same time makes available connecting contacts of the terminals **62** on

the end side. Here, the terminals serve to connect electrical lines between which a desired switching function is to be implemented. In order to be able to implement the desired switching function between the switching contacts of the terminals **62**, a slider **18** is also mounted in the rosette **54** so as to be axially slideable in the direction **16**. The rosette **54** can be connected to the sleeve **50** by a front ring **56**. For this purpose, corresponding threads (not illustrated) are provided, with the result that these components can be screwed to one another.

FIG. **4** shows a corresponding illustration of an electromechanical switching device **10** with a rotary toggle lever **12** of FIG. **2**. The present embodiment corresponds otherwise basically to how it has already been explained with respect to FIG. **3**, for which reason reference is made additionally to the statements in this regard. The difference between the electromechanical switching device **10** of FIG. **4** and that of FIG. **3** is essentially that the lock **46** is replaced by the rotary toggle lever **12**. This indicates that the electromechanical switching device **10** in accordance with the invention is of a modular configuration and components can be assembled in a way that is compatible with requirements, in order to be able to form the respectively desired electromechanical switching device. The activation can be performed, for example, either by a handle in the form of the rotary toggle lever or else via activation of a lock by a key. Each of these elements is connected to the corresponding link element in either a frictionally locking or positively locking manner.

The link element serves to convert the rotational movement into a translatory movement with respect to the slider. Accordingly, the rotational movement is transmitted to the slider **18** by a link of the link element.

In addition, the crown element is mounted in a longitudinally slideable manner in the direction **16** in the link element. At the same time, the crown element is connected in a rotationally fixed manner to the link element. As a result, the crown element follows a rotational movement of the link element. The crown element has a crown link that faces the one insertion base **58**. The insertion base **58** is arranged in the rosette **54** in a rotationally fixed manner and is secured in the longitudinal direction **16**. Owing to a prestress by the spring **48**, the crown link bears against a projection (not denoted) in the insertion base **58**. As a result of the guiding cam, made available by this structure, in the crown element and in the insertion base, these elements slide one on the other, with the result that a latching function and/or an instantaneous-contact function can be brought about.

It is therefore possible to use contours of the crown elements to implement functions such as latching or performing instantaneous contact both in connection with a lock as well as in connection with a rotary toggle lever. For example, five variants are possible, where the crown elements for both types of electromechanical switching devices can be identical.

The following variants of latching and performing instantaneous contact can be implemented in this embodiment:

Symbol (-) is equal to latching

Symbols (> or <) are equal to instantaneous contact to the left or to the right

3 positions latching: L-C-R

2 positions instantaneous contact: L>R

2 positions latching: L-R

2 positions instantaneous contact: L<R

3 positions instantaneous contact: L>C<R

3 positions latching/instantaneous contact: L-C<R

3 positions instantaneous contact/latching: L>C-R

The link element makes available the function of permitting a dual actuator or a triple actuator as a rotational activation unit. In the present embodiment, three variants are respectively present. The differences are the incorporation of the activation unit **12**, **44**, **46**. The activation unit **12**, **44**, **46** is latched to the link element **38**, **40**, **42**. For example, the lock **46** is connected in a positively locking fashion to the link element **38**, **40**, **42**.

As a result of the positioning of the activation unit **12**, **44**, **46** in relation to the respective link element **38**, **40**, **42**, a home position of the activation unit **12**, **44**, **46** can be defined. In the present embodiment, three variants are provided, specifically left, center and right (FIG. **8**). The corresponding home positions are illustrated one next to the other in FIG. **8**.

In FIGS. **5** and **6**, an arrangement of one of the link elements, here the link element **42**, with the stop disk **22** is illustrated in a schematic illustration.

FIG. **9** shows in a perspective exploded and schematic illustration different elements that can be combined to form the coupling unit **20**. It is apparent that one of three link elements **38**, **40**, **42** can be combined in each case with one of the crown elements **28**, **30**, **32**, **34**, **36**. In addition, the spring **48** is provided. These elements can be arranged in a respective rosette **54**. Each of the link elements **38**, **40**, **42** has a cutout (not designated) into which a latching projection (not denoted either) of a respective activation unit **12**, **44**, **46** can engage. As a result, the respective link element **38**, **40**, **42** can be connected in a rotationally fixed manner to the respective rotatable element of the activation unit **12**, **44**, **46**. The respective home position can be defined depending on the positioning of the activation unit **12**, **44**, **46** in relation to the link element **38**, **40**, **42**.

FIGS. **10** and **11** show rotary toggle levers **12**, **44** as activation units, where respective latching hooks **60** that are in engagement with the cutouts (designated above) of the respective link elements **38**, **40**, **42** are provided on the link side if a respective link element is connected to the respective rotary toggle lever.

FIG. **12** shows a schematic sectional view through the electromechanical switching device **10** of FIG. **2** in the assembled state. The latching of the rotary toggle lever **12** to the corresponding link element based on the latching via the latching hook **60** is apparent.

FIG. **13** shows three possible home positions of the rotary toggle lever **12** such as can be brought about with the embodiment of FIG. **12**.

FIGS. **14** and **15** show a connection between the lock **46** and the stop disk **22** in a perspective-schematic view, where different rotational-angle-limiting means are provided. For this purpose, a projection **64** (here a single projection), is provided on the lock body side, where the projection **64** protrudes radially and engages in a cutout **24** (FIG. **14**) or **26** (FIG. **15**), specifically as a function of which rotational angle is desired.

The cutouts **24**, **26** make available openings and bound the rotational angle about which the key can be rotated in the lock **46**. Here, the stop disk **22** is provided with two partially circumferential openings lying opposite, specifically the opening **24**, on the one hand, and the opening **26**, on the other. By correspondingly positioning the stop disk **22** opposite the lock **46**, the desired rotational angle can be set. The projection **64** then engages in the corresponding opening **24**, **26**. In FIG. **14**, the rotational angle is 90, whereas in FIG. **15** the rotational angle is 45. FIG. **16** shows the stop disk **22** in a perspective individual illustration from which the openings **24**, **26** are apparent. The stop disk **22** can be

connected in a rotationally fixed manner to a lock body of the lock **46** by further projections **66**. In this way, the stop is brought about.

FIG. **17** shows a perspective overall view of an electromechanical switching device **10** that is based on the rotary toggle lever. The desired rotary toggle lever can easily be connected, for example, in the present embodiment of the rotary toggle lever **12** or the rotary toggle lever **44**, to the electromechanical switching device **10**. The configuration corresponds basically to that which has already been explained with respect to FIG. **4**, for which reason reference is additionally made to these statements.

The description of the present exemplary embodiments serves merely to explain the invention and is not restrictive thereto. Of course, features of the description and of the figures can be combined with one another in virtually any desired way in order to be able to arrive at further advantageous refinements within the scope of the invention.

Furthermore, device features can, of course, also be formulated as method features, and vice versa.

Thus, while there have been shown, described and pointed out fundamental novel features of the invention as applied to a preferred embodiment thereof, it will be understood that various omissions and substitutions and changes in the form and details of the devices illustrated, and in their operation, may be made by those skilled in the art without departing from the spirit of the invention. For example, it is expressly intended that all combinations of those elements and/or method steps which perform substantially the same function in substantially the same way to achieve the same results are within the scope of the invention. Moreover, it should be recognized that structures and/or elements shown and/or described in connection with any disclosed form or embodiment of the invention may be incorporated in any other disclosed or described or suggested form or embodiment as a general matter of design choice. It is the intention, therefore, to be limited only as indicated by the scope of the claims appended hereto.

What is claimed is:

1. An electromechanical switching device for making available an electrical connection between at least two terminals as a function of a switched state based on a manual activation, wherein the electromechanical switching device is configured to be arranged in a switchboard of an electrical control device, the electromechanical switching device comprising:

an activation unit which is rotatably mounted and manually activateable;

a switching unit which is connectable to the activation unit, the switching unit, the switching unit including at least one switching element which is slideably mounted in a longitudinal direction of the electro-mechanical switching device to make available the at least two electrical terminals of the electromechanical switching device and electrically connect them to one another as a function of an electrical switched state; and

a coupling unit comprising a link element having a spring arranged therein, said coupling unit mechanically interconnecting the activation unit and the switching unit to one another and transmitting the manual activation of the activation unit to the switching element of the switching unit;

wherein the electromechanical switching device is formed in a modular manner via at least the activation unit, the coupling unit and the switching unit.

2. The electromechanical switching device as claimed in claim **1**, wherein the coupling unit includes a rotational-angle-limiting disk having at least one rotational-angle-limiting element.

3. The electromechanical switching device as claimed in claim **2**, wherein the rotational-angle-limiting disk is arranged in a rotationally fixed manner with respect to the switching unit.

4. The electromechanical switching device as claimed in claim **1**, wherein the link element of the coupling unit interacts with a crown element.

5. The electromechanical switching device as claimed in claim **2**, wherein the link element of the coupling unit interacts with a crown element.

6. The electromechanical switching device as claimed in claim **3**, wherein the link element of the coupling unit interacts with a crown element.

7. The electromechanical switching device as claimed in claim **4**, wherein the link element is rotatably mounted and connected in a rotationally fixed manner to a rotational axis of the activation unit.

8. The electromechanical switching device as claimed in claim **4**, wherein the crown element is rotatably mounted with the link element and slides in the link element in the longitudinal direction of the electromechanical switching device.

9. The electromechanical switching device as claimed in claim **7**, wherein the crown element is rotatably mounted with the link element and slides in the link element in the longitudinal direction of the electromechanical switching device.

10. The electromechanical switching device as claimed in claim **4**, wherein the crown element is prestressed in a direction of an insertion base.

11. The electromechanical switching device as claimed in claim **4**, wherein a link of the link element is mechanically connected to the switching element.

12. The electromechanical switching device as claimed in claim **1**, wherein the coupling unit has a modular configuration with a crown element, the link element and a spring.

13. The electromechanical switching device as claimed in claim **4**, wherein at least one of the crown element and the link element is arranged in an exchangeable manner in the coupling unit.

14. The electromechanical switching device as claimed in claim **12**, wherein the coupling unit is configured as a separate module.

* * * * *